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ENVIRONMENTAL LITERACY OF SEVENTH-DAY ADVENTIST TEACHERS IN THE PAROCHIAL SCHOOLS OF THE FLORIDA CONFERENCE OF SEVENTH-DAY ADVENTISTS

Abstract: In the United States, there is an environmental literacy problem. Americans possess limited knowledge about the environment and environmental issues, and they display limited positive action regarding the environment in which they live. Moreover, there is a debate whether a Christian's interpretation of Genesis 1:28 leads either to a lower or to a higher environmental literacy. The purpose of this study was to attempt to assess the environmental literacy of a group of Christian teachers, to determine the level of their environmental literacy, and to discover the interpretations that these educators have of Genesis 1:28.

Keywords: *Environmental literacy, environmental education, teachers*

Introduction

For those of us in the Christian community, the following biblical passage may be the starting point for a discussion of our role as it relates to the environment:

> God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground." (Gen. 1:28, NIV, 1984)

I believe that the Christian community's interpretation of these words generally sets the tone for its relationship with the natural world. The phrase "be fruitful and increase in numbers" is often interpreted as having to do with procreation of the human race, but this phrase has also

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been interpreted to mean having humans be good managers of the natural world God created. A group of Judeo-Christian scholars who published the Cornwall Declaration on Environmental Stewardship proposed that the phrase deals with humans and God making "provision for our temporal well-being and enhancing the beauty and fruitfulness of the rest of the earth" (Barkey, 2000, p. xiv). Consequently, the phrase could be interpreted as a proclamation by God to Christians requiring them to take an active role in practicing good stewardship of the natural world.

"Fill the earth and subdue it" does not have to be interpreted to mean giving humanity permission to abuse the environment; instead, it can be interpreted to mean using the earth's resources wisely. Barkey (2000) comments insightfully in his book, *Environmental Stewardship in the Judeo-Christian Tradition:*

> The Hebrew for conquering or subduing, (i.e. *"koveish"*) clearly distinguishes between annihilating and conquering. The former is a verb for utterly destroying one's enemy. The latter refers to leaving one's enemy's resources and abilities intact and even enhancing them, but redirecting them for one's own end. That is what we are told to do with the natural world. We may not destroy, but we may use them in every possible beneficial manner. (p. 12)

Barkey's implication is that Christians are to avail themselves of the world without causing harm to it.

God expects humans to take care of the earth, which He created for them. Thus, after He created humans in His image, God told them to rule over the earth:

> Then God said, "Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground." (Gen. 1:26, NIV, 1984)

The concept of "ruling over" as related to this text in the Bible is described by Wenham (1987) as "to rule nature as a benevolent king, acting as God's representative over them and therefore treating them in the same way as God who created them" (p. 33). A benevolent king takes care of his subjects. Thus humans, who are made in the image of God, are to take care of the environment God, the benevolent king, has given us. Barkey (2000) warns that "if man executes dominion in a way that ultimately destroys nature's creative potential or denies the human family the fruits of creation, such actions constitute an offense against God's original plan of creation" (p. 31).

Isaiah 45:18 makes it is clear that the world was made to be inhabited. The Bible also says, "The LORD God took the man and put him in the Garden of Eden to work it and take care of it" (Gen. 2:15, NIV, 1984).

From this perspective, human rule over creation consequently has human welfare as the focus, and the well-being of the world resources as a top priority. If we are going to have the world take care of us, we need to take care of it. Interdependence is vital.

Relative to the environment, there is a knowledge problem in the United States. In general, Americans possess a limited knowledge about the environment in which they live. Coyle (2005) gives some examples of this lack of knowledge:

> 45 million Americans think the ocean is a source of drinking water. One hundred million Americans think that aerosol cans are the main source of CFC's going into the atmosphere (in truth, CFC's in spray cans were completely banned in 1978) and a similar number think that disposable diapers are the leading problem in landfills (they actually account for about 1% of what ends up in land fills; paper products are by far the larger problem). (p. 20)

Environmental Education and Environmental Literacy

Historical Context

Many environmental educators credit Rachel Carson's two books, *The Sense of Wonder* (1965) and *Silent Spring* (1962), for triggering the modern environmental movement that started in the 1960s (Chepesiuk, 2007). In *The Sense of Wonder,* Carson encourages adults to take children out into nature and, in doing so, produce an awe that could lead to taking better care of the earth. *Silent Spring* brought the dangers of pesticides to the world's attention—specifically DDT—and the ecological damage that could result from their use.

In 1969, the first formal definition of environmental education (EE) was proposed by Stapp (1969) and his students at the University of Michigan:

> Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution. (Stapp et al., 1969, pp. 30-31)

It began to take shape with the publication of the *Journal of Environmental Education* and was followed in 1970 by the first Earth Day and passage of the National Environmental Education Act. Harvey (1976) attempted to determine if there existed an established definition. Finding that there was not one, he undertook its development. By using key-word and key-phrase analysis of existing definitions, he developed the following "mediating" definition:

> [Environmental education is] an interdisciplinary, integrated process concerned with resolution of values conflicts related to the

> man-environment relationship, through development of a citizenry with awareness and understanding of the environment, both natural and man-altered. Further, this citizenry will be able and willing to apply enquiry skills, and implement decision-making, problem-solving, and action strategies toward achieving/maintaining homeostasis between quality of life and quality of environment. (p. 158)

Many environmental educators point to two important documents: The Belgrade Charter (UNESCO-UNEP [United Nations Educational, Scientific and Cultural Organization—United Nations Environment Programme], 1976) and The Tbilisi Declaration (UNESCO, 1978). The following goal statement is made in the Belgrade Charter:

> The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the preventions of new ones. (UNESCO-UNEP, 1976, p. 2)

A couple years later, the first global intergovernmental conference on environmental education approved the Tbilisi Declaration. This declaration, coming from the Belgrade Charter, suggested that the basic aim of environmental education is to guide to an understanding of the complex nature of both the natural and built environments caused from the interaction of their social, economic, biological, physical, and cultural aspects. Its aim also includes providing help in gaining the knowledge, attitudes, values, and practical skills necessary for taking part in a responsible and effective way in predicting and solving environmental problems, and also in the management of the quality of the environment (UNESCO, 1978).

Hungerford, Peyton, and Wilke (1980) used those two statements to suggest that the superordinate goal of environmental education is "to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment" (p. 44).

Through the years since, the definition of EE (environmental education) has become more refined, but agreement on a single definition has still not been reached. The definitions used today continue to include such terms as *aware, motivated,* and *knowledgeable,* but include language dealing with responsible actions, critical thinking, and responsible decision making. Nevertheless, the less complex Stapp (1969) definition is the most commonly cited and is most often used by practitioners (Disinger, 2001).

The formation of an environmentally literate citizenry is the major

goal of EE (Culen, 1998; Disinger & Roth, 1992; Harvey, 1976; McBeth & Volk, 2010; Moody & Hartel, 2007). Hungerford et al. (1980) emphasized using environmental education curricula to increase environmental literacy. They suggested these curricula needed to be more than just a basic understanding of the environment. They came up with four goal levels to produce an environmentally literate citizenry. Level I, ecological-foundations curricula, focused on building ecological-foundational knowledge in areas such as individuals and populations, biogeochemical cycling, succession, and the ecological impacts of human's activities. Level II, conceptual-awareness curricula, would help "receivers" develop awareness of how the environment is viewed and valued. Level III, investigation and evaluation curricula, would allow "receivers" to investigate environmental issues/problems and evaluate alternate solutions to those issues/problems. Lastly, Level IV, environmental-action skills curricula, would teach "receivers" the skills necessary for them to take action.

Disinger and Roth (1992) credit Charles E. Roth with coining the term *environmental literacy* in 1968. President Nixon used the term in his August 1970 Environmental Message to Congress:

> It is also vital that our entire society develop a new understanding and a new awareness of man's relation to his environment—what might be called "environmental literacy." This will require the development and teaching of environmental concepts at every point in the educational process. (Disinger & Roth, 1992, p. 11)

Disinger and Roth (1992) also note that although the term "environmental literacy" has been used for decades by environmental-education experts, it still lacks a precise definition. They suggest the following definition:

> Environmental literacy should be defined . . . in terms of observable behaviors. That is, people should be able to demonstrate in some observable form what they have learned—their knowledge of key concepts, skills acquired, disposition toward issues, and the like. (p. 3)

Roth (1992) provided descriptions of individuals at his three proposed levels of environmental literacy:

> **Nominal environmental literacy** indicates a person able to recognize many of the basic terms used in communicating about the environment and able to provide rough, if unsophisticated, working definitions of their meanings. . . . **Functional environmental literacy** indicates a person with a broader knowledge and understanding of the nature of and interactions between human social systems and other natural systems. . . . **Operational literacy** indicates a person who has moved beyond functional literacy in both breadth and depth of understandings and skills who routinely evaluates the impacts and consequences of actions. (emphasis in original, p. 18).

Due to the increased concern for the environment, EE is beginning to receive more attention in the media, but is still not a high priority in American schools (Cole, 2007; Ernest, 2007; Wilson & Smith, 1996). As stated in the literature, part of the problem is that EE should be interdisciplinary, but many teachers feel that it should be taught in the science classes (Cole, 2007; Wade, 1994) and do not feel that they have room in their already-packed curriculum.

Successful EE is dependent on the classroom teacher (Ramsey, Hungerford, & Volk, 1992). Many do not know how to teach it, because EE is not typically included in their training (Buethe & Smallwood, 1986) nor is it generally referred to in professional journals of education (Wilson & Smith, 1996).

Two statewide surveys and one national survey have been conducted to discover the environmental literacy of the citizenry. All three found limited environmental literacy. Coyle's (2005) study, the national survey, reported differences based on gender, age, and level of education. The same was found in Pennsylvania (Johnson & Smith-Sebasto, 2000) and Minnesota (Murphy, 2002), along with differences based on socio-economic class and urban versus suburban and rural living locations.

Educational Context

Teachers' classroom presentations are affected greatly by their knowledge base and affective relationship to the subject matter being presented (Buethe & Smallwood, 1986). This means that if teachers do not have the knowledge and/or skill to incorporate EE into the program of study, their students could be limited in reaching significant levels of environmental literacy.

There is limited research on teachers' environmental literacy, even though environmental literacy is an important goal of EE. The limited research that has been done shows that teachers have limited environmental literacy. In the United States, only a few states' teachers have even been surveyed. Buethe and Smallwood (1986) studied teachers in Indiana. Todt (1995) looked at Ohio teachers. Owens (2000) looked at urban teachers in a southern state. Champeau's (1997) study of Wisconsin teachers was the most comprehensive study that I found of any one state's teachers.

The lack of environmental literacy in education is not just an American problem. Cutter (2002) explored knowledge and attitudes of Australian elementary teachers and found them lacking. Hsu (1997) studied responsible environmental behaviors of secondary teachers in

Taiwan and discovered that they also had limited environmental literacy. More research is needed to better evaluate teachers' environmental literacy.

Owens (2000) studied middle-school teachers from a southern state and reported differences in environmental literacy due to gender, racial-ethnic background, years of teaching, and subject area taught. This study seemed to demonstrate that teachers' environmental literacy parallels that of society in that it was not well developed.

Religion and Environmental Attitudes

Lynn White (1967) famously argued that Judeo-Christian doctrines are anti-environment, because of the prominence of the separation of man from nature—the idea that nature is there to meet humanity's needs. White put forth the idea that individuals' views and the way they interact with the environment are anchored in a religious system of belief, and that the Judeo-Christian ethic gives humans the right to do as they see fit with the environment.

While White (1967) did not directly study the relationship between religion and environmental concern, later studies have shown some support for White's assertions. Hand and Van Liere (1984), for example, while sampling residents of the state of Washington, examined the link between mastery-over-nature orientation, religious identification and commitment, and concern for environmental problems. Their findings were that non-Judeo-Christians were slightly more likely to show concern for the environment, but that among Judeo-Christian denominations, there was considerable variation in the relationship to the mastery-over-nature orientation. Hand and Van Liere suggested that the denominations that were viewed as being more "conservative" (Baptists and Mormons) were more likely to emphasize the dominance-of-nature doctrine as compared to the more "liberal" (Episcopalians and Methodists) denominations. Hand and Van Liere felt that the "liberal" denominations might in fact be oriented to a stewardship ethic.

Other authors have attempted to provide support for White's (1967) thesis. Worster (1994) suggested that the pastorialistic tendencies of Christianity lead only to one conclusion—that mankind is dominant over all other creation. The exclusion of all but humanity from divine grace and the anthropocentric values of the religion have separated man from nature. Nature is seen as a means to support man's desires. Eckberg and Blocker's (1996) research showed support for Christian theology being "anti-environmental," but they suggested that this was largely an effect

of fundamentalism or sectarianism and did not support a "stewardship" theme. Guth, Kellstedt, and Smidt (1995) reported those outside of the Judeo-Christian tradition to be the most pro-environment, but they did find variation in environmentalism among different religious traditions.

Clifford (1994) presents a concept that has appeared more recently in print (though it has been held in certain orthodox Christian beliefs for an extended time) and that is anti-environment. Some Christians have been using eschatological arguments that if God is going to destroy the present world to make way for a new earth, why should there be concern for the present environment.

However, there has been research that seems to negate the basic premise of White's (1967) thesis and instead suggests that religion may cause a pro-environmental stewardship effect (Eckberg & Blocker, 1996; Kanagy & Nelsen, 1995; Kanagy & Willits, 1993; Kearns, 1997; Shaiko, 1987; Shibley & Wiggins, 1997; Wolkomir, Futreal, Woodrum, & Hoban, 1997). Much of this has to do with a belief that there is a principle of stewardship of creation implied in the book of Genesis (Barkey, 2000; Harrison, 1999; Irwin & Pellegrino, 1994). These conflicting results could stem from using different measures of both religiosity and environmental orientations and behaviors. Some have suggested that early studies were hindered in that they incorporated only a few questions assessing pro-environmentalism, which did not measure adequately pro-environmental attitudes or behavior (e.g., Greeley, 1993; Hayes & Marangudakis, 2001). This concern of methodology is important because of the research, which found that the relationship between Christian beliefs and environmentalism is dependent on the way in which environmentalism is measured (Klineberg, McKeever, & Rothenbach, 1998). Some authors suggest that many researchers ignore the complex interrelationships between religious and political factors, which cause environmental concern and activism (Greeley, 1993; Wolkomir et al., 1997).

In research not focused on specific denominations, Kanagy and Nelsen (1995) used data from a national sample to study the relationship between three measures of religiosity and three attitudes about the environment. They found that when religiosity alone was studied, religious respondents were less likely than non-religious respondents to support additional federal funding to protect the environment, but when age, gender, and region of the county were controlled for, these effects were much less significant. Their argument was that it was not accurate to suggest that those in Judeo-Christian traditions are less concerned about the environment than those from other traditions.

Hayes and Marangudakis (2001) found no significant difference between Christians and non-Christians in environmental attitudes, although they did find that among Christian denominations, Roman Catholics are the most skeptical toward nature. These authors concluded that the two most notable and consistent factors in determining pro-dominion attitudes were educational attainment and levels of scientific knowledge about the environment.

Some authors have also examined the relationships between religious affiliation and environmental attitudes by conducting analyses across several religious groups at once, rather than focusing on a specific religious culture (Boyd, 1999; Eckberg & Blocker, 1996; Kanagy & Nelsen, 1995; Kearns, 1996; Schultz, Zelenzy, & Dalrymple, 2000). In a number of these studies, differences in environmental concern were linked with specific religious denominations and traditions (Boyd, 1999; Hand & Van Liere, 1984).

The conflict over "master of nature" versus "stewardship of nature" could have a direct bearing on environmental literacy. A "master of nature" belief system would lead to a lower environmental literacy, whereas a "stewardship of nature" belief system would lead to a higher environmental literacy.

In 1996, the Seventh-day Adventist church released a "Statement on Stewardship of the Environment" (General Conference of Seventh-day Adventists, 1996). This statement advocates "reformation of lifestyle . . . based on respect for nature, restraint in the use of the world's resources, reevaluation of one's needs, and reaffirmation of the dignity of created life" (p. 1). The ideas of respect for nature, restraint in use, evaluations of one's needs, and dignity of life are key components of EE. The Adventist parochial education system serves the important purpose of educating the youth of the church. Therefore, it is reasonable to assume that the denomination has an interest in how well its statement of faith related to stewardship is being supported by the teachers in its schools.

There has been very little research done on Seventh-day Adventists' views about the environment or their environmental literacy. The purpose of this study was to attempt to assess the environmental literacy of a group of teachers in Seventh-day Adventist parochial schools who teach in the schools of the Florida Conference of Seventh-day Adventists, to determine their level of environmental literacy. The study specifically looked at four dimensions of these teachers' environmental literacy: (a) teachers' attitudes toward the environment, (b) teachers' feeling toward their roles in causing environmental change, (c) teachers'

interactions with their environment, and (d) teachers' level of knowledge about the environment and issues involved. The teachers' interpretations of Genesis 1:28 were also studied.

Methodology

All 186 teachers of the parochial schools of the Florida Conference of Seventh-day Adventists were asked to respond to a survey. The study used an adapted version of the Wisconsin Environmental Literacy Survey (WELS), originally produced to assess the environmental literacy of Wisconsin 11th grade students (Wisconsin Center for Environmental Education, 1994). The adaptations were the inclusion of the questions related to Genesis 1:28 and changes to the demographic portion of the WELS. The survey was made up of the following parts:

- *Part I* of the survey measured the affective learning outcomes (teachers' attitudes toward the environment and their feeling toward their role in causing environmental change).
- *Part II* of the survey assessed self-reported environmental behaviors and perspectives on those behaviors (teachers' interactions with the environment).
- *Part III* of the survey measured cognitive learning outcomes (teachers' level of knowledge about the environment and issues involved).
- *Part IV* collected demographics, including (a) gender, (b) racial/ethnic background, (c) age, (d) number of years teaching, (e) college major, (f) area of specialty, and (g) self-evaluation of environmental literacy.
- *Part V* of the survey attempted to determine the participants' interpretations of Genesis 1:28. This section was composed of three open-ended questions to which the teacher could write his or her response. The responses were then analyzed for patterns.

Subscale scores were calculated for the first three parts as a mean of all statements in that section and converted to a percentage. An overall environmental literacy score was calculated by finding the mean percentage of the three subscale scores. The procedure for scoring the survey was designed so that the higher the numerical mean for each subscale, the higher the estimated level of environmental literacy.

Summary of Key Findings

1. Teachers in the study revealed nominal environmental literacy with a mean total environmental literacy score of 66%.
2. Teachers in the study scored highest (76%) on the cognitive (knowledge) subscale. Behavioral subscale scores were the lowest (48%) of the three subscale scores. Affective (beliefs and attitudes) subscale scores were 73%.
3. White Non-Hispanics scored significantly higher (79%) than did Hispanics (66%) on the cognitive (knowledge) subscale.
4. There was no significant different between ages, years of teaching and major.
5. Two prevailing themes teachers presented from their consideration of Genesis 1:28 were responsibility for the environment and need to take care of the environment. Two lesser themes were the earth as a gift from God and the idea that the earth is there to be used for self-serving needs.

Discussion of Findings

The teachers of the parochial schools operated by the Florida Conference of Seventh-day Adventists who participated in the study showed nominal environmental literacy. The mean total environmental literacy score was 66%. The subscale on which the participants scored the highest was the cognitive subscale (76%), followed by the affective subscale (73%) and, lastly, the behavioral subscale (49%). As suggested by the scores, these teachers have room for improvement, like many other populations studied (Buethe & Smallwood, 1986; Champeau, 1997; Nagra, 2010; Owens, 2000; Todt, 1995).

Relationship Between Cognitive Subscale and Other Subscales

Affective and Behavioral Subscales

This study found no correlation between the knowledge component of environmental literacy and the affective or behavioral components. This is consistent with previous studies of individuals (Chawla, 1998; Hines, Hungerford, & Tomera, 1986/1987; Kollmuss & Agyeman, 2002; Marcinkowski, 1989; Sia, Hungerford, & Tomera, 1985/1986; Wilke, 1995; Zelezny, 1999). This implies that there needs to be more than just an accumulation of knowledge about the environment. There needs to be exposure to make things an important part of our life. Life experiences are important to our development as persons. Baba Dioum, African environmentalist, in his speech to the World Conservation Union in 1968, summed it up in this way: "In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught" (Main, 2004, p. 11). Richard Louv (2005), in *Last Child in the Woods,* reinforces the idea of connection between time spent in nature and a concern for the environment.

Ethnicity

Owens (2000) reported that European Americans scored significantly higher than did African Americans on both the cognitive subscale (p = .000) and total environmental literacy scores (p = .004). Owen's sample was 49% African American, 36% European American, and 15% "Other." This current study reports that White non-Hispanics (79%) scored significantly higher than did Hispanics (66%) on the cognitive subscale (p = .004). There has been very limited research on Hispanics when it comes to environmental attitudes, knowledge, or behaviors (Whittaker, Segura, & Bowler, 2005). Peterson, Sternberg, Lopez, and Liu (2008)

found that Latinos had low wildlife knowledge, which seems to support the findings of the current study. Further study into the relationship of ethnicity and environmental literacy is needed, especially in the understudied Hispanic community.

Frequently Missed Questions

Analysis of answers given on the cognitive subscale revealed that the participating teachers had adequate knowledge of ecological concepts. Areas for improvement include knowledge of ecological principles involving individuals, populations, and communities; knowledge of environmental problems and issues; and knowledge of environmental issue investigation and action strategies.

Environmental Sensitivity and Attitudes Toward Environment

This study suggests that the participating teachers feel that the environment should be protected. Most teachers felt it was their responsibility to help solve environmental problems and that the things they do have an effect on the quality of the environment. The conflict came when personal freedom was going to be impacted by governmental regulations. When questions involving regulations were answered, respondents were still pro-environment, but the responses where more scattered along the spectrum. These results were similar to those reported by Brehm and Eisenhauer (2006) on their Mormon population. In their study, Mormons showed great concern for the environment, but showed lower perception of importance and stronger opposition to public-land restrictions. Truelove and Joireman (2009) found that Christian orthodoxy was negatively related to willingness to pay for environmental protection.

The statement "I believe that plants and animals exist to be used by humans" produced a response pattern with similar rates for *strongly agree, agree, no opinion,* and *disagree*. This pattern seems to support White's (1967) idea that nature is there to meet humanity's need and the Judeo-Christian ethic gives humans the right to do as they see fit with the environment. It is also consistent with findings of Klineberg et al. (1998). But when looked at in the context of the participant's view of Genesis 1:28, it can be explained that Christian teachers believe they are responsible for taking care of the environment. Moreover, there was a minor theme of the earth being a gift from God.

When the responses from the open-ended question were analyzed, clear themes favorable to the environment emerged. This positive view

of the environment paralleled the results from the quantitative portion of the survey. The view of humanity being above the other organisms of the earth, but at the same time being responsible for taking care of the environment, was clearly evident. The presence of this concept is consistent with that which was found by others who have studied the views of other Christians (Kanagy & Nelsen, 1995; Kanagy & Willits, 1993; Kearns, 1997; Shaiko, 1987; Shibley & Wiggins, 1997; Wolkomir et al., 1997).

Environmentally Responsible Behavior and Actions

There is a dichotomy between the teachers' affective (attitudes and beliefs) domain and their behavioral domain. Even though the teachers in this study say that protecting the environment is important, most of them also responded that they *never* or *almost never* walk, take public transportation, or ride a bike instead of using a car in order to help protect the environment. They *sometimes* avoid purchasing products that have a negative impact on the environment or are over-packaged. This is consistent with the findings that when Christians have a trade-off between environmental interests and economic interests, they show less support for the environment than non-Christians (Eckberg & Blocker, 1996; Greeley, 1993; Hand & Van Liere, 1984; Klineberg et al., 1998). Teachers did report that they *almost always* turn off lights and appliances to conserve electricity, and most of them recycle paper, glass, and/or metal waste products, but this could be for economic reasons, as suggested by Owens (2000).

The teachers in this study choose not to be politically active, as demonstrated by the vast majority who reported that they *never* or *almost never* take the time to write a letter to either a politician or newspaper about environmental views, problems, or issues. The majority of the respondents report that they do not report environmental problems or violations to proper authorities.

The environmental behaviors of the teachers of this study seem to be based more upon convenience than conviction. This leads to an evaluation of their environmental literacy being at a nominal level, as opposed to the functional and operational levels, as described by Roth (1992) earlier in this article.

Implications of the Study and Recommendations for Practice

Davidson (2008) points out that "the overwhelming impression gained from Scripture, the sole document on which the Christian faith is

established, is that of the aesthetic nature of God flooding His revealed Word and created world" (p. 178). Because of this, Christians should want to take care of the environment. Unfortunately, the teachers of the Florida Conference of Seventh-day Adventists show only nominal environmental literacy. They do not seem to differ significantly from the general population of the United States. If the Seventh-day Adventist Church is serious about the need for environmental stewardship within its membership, it should consider ways to improve the existing condition. Teachers with suitable environmental literacy can widen the impact of environmental education broadly and effectively (UNESCO, 1988), and this could lead to improvement in environmental literacy for generations to come.

The leadership of the educational program of the Florida Conference of Seventh-day Adventists, as well as the leadership of the educational program of the North American Division of Seventh-day Adventists, may wish to give study to creating opportunities for enhanced and ongoing professional development. Such opportunity might focus on improving environmental knowledge and skills in teaching students about environmental issues, including the use of interdisciplinary field-based and research-based learning, as well as innovative technology in the classroom. Teachers could be provided with training on ways to provide field experiences as part of the regular school curriculum and to create programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition. It is not just knowledge that the students need to receive, because it has been shown that knowledge does not necessarily translate into attitude change or pro-environmental behavior (Chawla, 1998; Hines et al., 1986/1987; Kollmuss & Agyeman, 2002; Marcinkowski, 1989; Sia et al., 1985/1986; Wilke, 1995, Zelezny, 1999).

Apparently, there are few programs that prepare teachers to provide coursework in environmental education and even fewer that require coursework in EE. Teacher preparation programs should require appropriate EE learning so that teachers emerge from training at least at the functional level in environmental literacy. There could be a requirement put in place that a class involving nature-based education be included in the certification requirements for teachers. Advanced teacher training could result in teachers performing at the operational level.

This study corroborates the idea that a holistic approach is needed to attain greater environmental literacy. There needs to be more than just an increase in knowledge. There also needs to be exposure to the environment so that individuals will connect with the environment; this

exposure will lead to an increase in a change in behavior and attitudes. Culen and Mony (2003) showed that even non-formal outdoor programming increases environmental literacy of students.

It is clear that providing more knowledge does not necessarily change behaviors and attitudes; although WELS scores were relatively high for cognitive (76%) and affective (73%) subscales, the behavioral subscale score was low (48%) in this study. More research could further explore the reason for this apparent disconnect between what is known and felt as compared to what is actually done. Why are these teachers not deciding to behave in the manner in which they seem to feel that they should?

Environmental education involves more than just scientific understanding. It underscores attitudes, actions, and beliefs. It involves people who have attitudes, behaviors, and concerns. Environmental issues also involve such issues as geography, economics, and race. Teachers should provide more than just a solid science education. They should equip students with life skills that will guide them in becoming responsible citizens. Before teachers can do that, however, they need to be trained to do so. This involves more than just science teachers; it must involve all teachers, regardless of the subject areas they teach. This study could be useful in the advancing of discussion about the need for environmental education programs in teacher education and the development of such programs.

Conclusion

In conclusion, this research does not support White's (1967) idea that Judeo-Christian teaching causes anti-environmental attitudes and behaviors. This study seems to show that the teachers in the parochial schools of the Florida Conference of Seventh-day Adventists do not show environmental literacy that is very different from that of the general public, which is nominal. The teachers' knowledge is adequate, and they say that being responsible for the environment and caring for it is part of the biblical message of Genesis 1:28, but their behaviors seem disconnected from this belief.

As Christian leaders, we need to be purposeful in our role of promoting care of the natural environment and our interactions with it. Sometimes this means incurring some financial expense to promote a more environmentally friendly approach. Christians need to develop an environmental education curriculum which integrates a spiritual component. We are called to be an example to the world around us. The

development of a community of individuals with high environmental literacy would be an excellent place to start.

References

Barkey, M. B. (Ed.). (2000). *Environmental stewardship in the Judeo-Christian tradition.* Grand Rapids, MI: Acton Institution for the Study of Religion and Liberty.

Boyd, H. H. (1999). Christianity and the environment in the American public. *Journal for the Scientific Study of Religion, 38*(1), 36-44.

Brehm, J. M., & Eisenhauer, B. W. (2006). Environmental concern in the Mormon Culture Region. *Society and Natural Resources, 19*(5), 393-410.

Buethe, C., & Smallwood, J. (1986). Teachers' environmental literacy: Check and recheck, 1975 and 1985. *The Journal of Environmental Education, 18*(1), 39-42.

Carson, R. (1962). *Silent spring.* Boston, MA: Houghton Mifflin.

Carson, R. (1965). *The sense of wonder*. New York, NY: Harper & Row.

Champeau, R. (1997). E*nvironmental education in Wisconsin: Are we walking the talk?* Stevens Point, WI: Wisconsin Center for Environmental Education.

Chawla, L. (1998). Significant life experiences: A review of research on sources of environmental sensitivity. *The Journal of Environmental Education, 29*(3), 11-21.

Chepesiuk, R. (2007). Environmental literacy: Knowledge for a healthier public. *Environmental Health Perspectives, 115*(10), A494-A499.

Clifford, R. J. (1994). The Bible and the environment. In K. W. Irwin & E. Pellegrino (Eds.), *Preserving the creation* (pp. 1-26). Washington, DC: Georgetown University Press.

Cole, A. G. (2007). Expanding the field: Revisiting environmental education principles through multidisciplinary frameworks. *The Journal of Environmental Education, 38*(2), 35-44.

Coyle, K. (2005). *Environmental literacy in America*. Washington, DC: The National Environmental Education & Training Foundation.

Culen, G. R. (1998). The status of environmental education with respect to the goal of responsible citizenship behavior. In H. Hungerford, W. Bluhm, T. Volk, & J. Ramsey (Eds.), *Essential readings in environmental education* (3rd ed.). Champaign, IL: Stipes.

Culen, G. R., & Mony, P. R. (2003). Assessing environmental literacy in a nonformal youth program. *The Journal of Environmental Education, 34*(4), 26-28.

Cutter, A. (2002, April 1-5). *The value of teachers' knowledge: Environmental education as a case study*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Davidson, J. A. (2008). *Toward a theology of beauty: A biblical perspective*. Lanham, MD: University Press of America.

Disinger, J. F. (2001). K-12 education and the environment: Perspectives, expectations, and practice. *Journal of Environmental Education, 33*(1), 4-11.

Disinger, J. F., & Roth, C. E. (1992). *Environmental literacy*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education. (ERIC/CSMEE Digest No. ED 351201)

Eckberg, D. L., & Blocker, J. T. (1996). Christianity, environmentalism, and the theoretical problem of fundamentalism. *Journal of the Scientific Study of Religion, 35*(4), 343-355.

Ernest, J. (2007). Factors associated with K-12 teachers' use of environment-based education. *The Journal of Environmental Education, 38*(3), 15-31.

General Conference of Seventh-day Adventists. (1996). *Statement on stewardship of the environment*. Retrieved from http://www.adventist.org/beliefs/statements/main_stat10.html

Greeley, A. (1993). Religion and attitudes toward the environment. *Journal of the Scientific Study of Religion, 32*(1), 19-28.

Guth, J. L., Green, J. C., Kellstedt, L. A., & Smidt, C. E. (1995). Faith and the environment: Religious beliefs and attitudes on environmental policy. *American Journal of Political Science, 39*(2), 364-382.

Hand, C. M., & Van Liere, K. D. (1984). Religion, mastery-over-nature, and environmental concern. *Social Forces, 63*(2), 555-570.

Harrison, P. (1999). Subduing the earth: Genesis 1, early modern science, and the exploitation of nature. *The Journal of Religion, 79*(1), 86-109.

Harvey, G. D. (1976). *Environmental education: A delineation of substantive structure* (Unpublished doctoral dissertation). Southern Illinois University, Carbondale.

Hayes, B. C., & Marangudakis, M. (2001). Religion and attitudes towards nature in Britain. *British Journal of Sociology, 52*(1), 139-155.

Hines, J., Hungerford, H., & Tomera, A. (1986/87). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education, 18*(2), 1-8.

Hsu, S. (1997). *An assessment of environmental literacy and analysis of predictors of responsible environmental behavior held by secondary teachers in Hualien County of Taiwan* (Unpublished doctoral dissertation). Ohio State University, Columbus.

Hungerford, H., Peyton, R. B., & Wilke, R. J. (1980). Goals for curriculum development in environmental education. *The Journal of Environmental Education, 11*(3), 42-47.

Irwin, K. W., & Pellegrino, E. (1994). *Preserving the creation: Environmental theology and ethics*. Washington, DC: Georgetown University Press.

Johnson, P., & Smith-Sebasto, N. J. (2000). *The first Pennsylvania environmental readiness for the 21st century survey report*. Slippery Rock, PA: Slippery Rock University, Pennsylvania Center for Environmental Education.

Kanagy, C. L., & Nelsen, H. M. (1995). Religion and environmental concern: Challenging the dominant assumptions. *Review of Religious Research, 37*(1), 33-45.

Kanagy, C. L., & Willits, F. K. (1993). A greening of religion? Some evidence from a Pennsylvania sample. *Social Science Quarterly, 74*(3), 674-683.

Kearns, L. (1996). Saving the creation: Christian environmentalism in the United States. *Sociology of Religion, 57*(1), 55-70.

Kearns, L. (1997). Noah's ark goes to Washington: A profile of evangelical environmentalism. *Social Compass, 44*(3), 349-366.

Klineberg, S. L., McKeever, M., & Rothenbach, B. (1998). Demographic predictors of environmental concern: It does make a difference how it's measured. *Social Science Quarterly, 79*(4), 734-753.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239-260.

Louv, R. (2005). *Last child in the woods.* Chapel Hill, NC: Algonquin Books of Chapel Hill.

Main, M. B. (2004). Mobilizing grass-roots conservation education: The Florida Master Naturalist Program. *Conservation Biology, 18*(1), 11-16.

Marcinkowski, T. (1989). *An analysis of correlates and predictors of responsible environmental behavior* (Unpublished doctoral dissertation). Southern Illinois University, Carbondale.

McBeth, W., & Volk, T. L. (2010). The national literacy project: A baseline study of middle grade students in the United States. *The Journal of Environmental Education, 41*(1), 55-67.

Moody, G. M., & Hartel, P. G. (2007). Evaluating an environmental literacy requirement chosen as a method to produce environmentally literate university students. *International Journal of Sustainability in Higher Education, 8*(3), 355-370.

Murphy, T. P. (2002). *The Minnesota report card on environmental literacy.* St. Paul, MN: Hamline University, Center for Global Environmental Education.

Nagra, V. (2010). Environmental education awareness among school teachers. *The Environmentalist, 30*(2), 153-162.

Owens, M. A. (2000). *The environmental literacy of urban middle school teachers* (Unpublished doctoral dissertation). Emory University, Atlanta, GA.

Peterson, M., Sternberg, M., Lopez, A., & Liu, J. (2008). Ocelot awareness among Latinos on the Texas and Tamaulipas border. *Human Dimensions of Wildlife, 13*(5), 339-347.

Ramsey, J., Hungerford, H., & Volk, T. (1992). Environmental education in the K-12 curriculum: Finding a niche. *The Journal of Environmental Education, 23*(2), 35-45.

Roth, C. E. (1992). *Environmental literacy: Its roots, evolution, and directions in the 1990s.* Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. (ERIC Document Reproduction Service No. ED 348 235)

Schultz, P. W., Zelenzy, W. L., & Dalrymple, N. J. (2000). A multinational perspective on the relation between Judeo-Christian religious beliefs and attitudes of environmental concern. *Environment and Behavior, 32*(4), 576-591.

Shaiko, R. G. (1987). Religion, politics, and environmental concern: A powerful mix of passions. *Social Science Quarterly, 68*(2), 244-262.

Shibley, J., & Wiggins, J. (1997). The greening of mainline American religion: A sociological analysis of the environmental ethics of the national religious partnership for the environment. *Social Compass, 44*(3), 333-348.

Sia, A., Hungerford, H., & Tomera, A. (1985/86). Selected predictors of responsible environmental behavior. *The Journal of Environmental Education, 17*(2), 31-40.

Stapp, W. B., et al. (1969). The concept of environmental education. *The Journal of Environmental Education, 1*(1), 30-31.

Truelove, H. B., & Joireman, J. (2009). Understanding the relationship between Christian orthodoxy and environmentalism: The mediating role of perceived environmental consequences. *Environment and Behavior, 41*(6), 806-820.

Todt, D. E. (1995). *An investigation of the environmental literacy of teachers in south-central Ohio using the Wisconsin Environmental Literacy Survey, concept mapping and interviews* (Unpublished doctoral dissertation). Ohio State University, Columbus.

UNESCO. (1978). *The Tbilisi Declaration: Final report, Intergovernmental Conference on Environmental Education.* Paris, France: Author.

UNESCO. (1988). *Final report, Intergovernmental Conference on Environmental Education* (Mockba, United Nations Educational, Scientific and Cultural Organization with UNEP). Paris, France: Author.

UNESCO-UNEP. (1976). The Belgrade Charter. Connect: UNESCO-UNEP. *Environmental Education Newsletter, 1*(1), 1-2.

Wade, K. (1994). *National survey of EE teacher inservice education.* Ann Arbor, MI: National Consortium for Environmental Education and Training.

Wenham, G. J. (1987). *Genesis 1-15.* Waco, TX: Word.

White, L. (1967). The historical roots of our ecological crisis. *Science, 155*(3767), 1203-1207.

Wilson, R. A., & Smith, J. (1996). Environmental education and the education literature. *The Journal of Environmental Education, 27*(2), 41-42.

Wisconsin Center for Environmental Education. (1994). *High school environmental survey*. Stevens Point, WI: Author.

Whittaker, M., Segura, G., & Bowler, S. (2005). Racial/ethnic group attitudes toward environmental protection in California: Is "environmentalism" still a White phenomenon? *Political Research Quarterly, 58*(3), 435-447.

Wilke, R. (Ed.). (1995). Environmental education literacy/needs assessment project: Assessing environmental literacy of students and environmental education needs of teachers. Final report for 1993-1995. Stevens Point, WI: University of Wisconsin-Stevens Point.

Wolkomir, M. J., Futreal, M., Woodrum, E., & Hoban, T. (1997). Denominational subcultures of environmentalism. *Review of Religious Research, 38*(4), 325-243.

Worster, D. (1994). *Nature's economy: A history of ecological ideas.* Cambridge, England: Cambridge University Press.

Zelezny, L. (1999). Educational interventions that improve environmental behaviors: A meta-analysis. *The Journal of Environmental Education, 31*(1), 5-14.